WHAT IS CLAIMED IS:

1. A stent delivery assembly for treating bifurcated vessels having a side-branch vessel and a main vessel, comprising:

a side-branch catheter having a proximal end and a distal end;

an expandable member proximate the distal end of the catheter;

a tracking guide wire lumen extending within at least a portion of the side-branch catheter;

a tracking guide wire having a distal end and a proximal end and sized for slidable movement within the tracking guide wire lumen;

a positioning guide wire lumen associated with the expandable member and adapted to receive for slidable engagement a positioning guide wire, the positioning guide wire having a distal end and a proximal end;

the proximal ends of the tracking and positioning guide wires extend out of the patient and can be manipulated so that the distal end of the positioning guide wire is advanced in the main vessel distal to the side-branch vessel, and the distal end of the tracking guide wire is advanced into the side-branch vessel.

2. The stent delivery assembly of claim 1, wherein the positioning guide wire lumen is attached to an outer surface of the catheter and extends along to just proximal of the expandable member.

3. The stent delivery assembly of claim 2, wherein the positioning guide wire lumen includes an angulated section.

4. The stent delivery assembly of claim 2, wherein the positioning guide wire lumen includes a straight portion and an angulated portion.

5. The stent delivery assembly of claim 4, wherein the angulated portion is at an angle relative to the straight portion taken from the range of angles of 5 degrees to 90 degrees.

6. The stent delivery assembly of claim 1, wherein a stent is mounted on the expandable member and the stent includes an angled proximal end for mounting on the expandable member and for deployment in the side-branch vessel.

7. The stent delivery assembly of claim 1, wherein a side-branch vessel stent is removeably mounted on the expandable member and configured for implanting in the side-branch vessel.

8. The stent delivery assembly of claim 7, further comprising:

a main-vessel catheter having a distal end and a proximal end and having a tracking guide wire lumen extending through at least a portion thereof;

the tracking guide wire lumen of the main-vessel catheter being sized for receiving the tracking guide wire for slidable movement therein;

an expandable member positioned near the main-vessel catheter distal end for delivering and implanting a main-vessel stent adjacent to the side-branch vessel stent; and

a positioning guide wire lumen attached to the outer surface of the main-vessel catheter and extending over at least a portion of the surface of the expandable member and sized for

slidably receiving the positioning guide wire, the positioning guide wire lumen advancing over the positioning guide wire to orient the expandable member adjacent to, but not in, the side-branch vessel.

9. The stent delivery assembly of claim 1, wherein the positioning guide wire comprises an integrated stent-positioning guide wire for accurately positioning a stent, and wherein the side-branch catheter is configured for rapid exchange so that the catheter can be unzipped from the integrated stent-positioning guide wire leaving the guide wire in place for additional interventions.

10. The stent delivery assembly of claim 1, wherein the expandable member including an angled proximal taper balloon for deploying a proximal angled stent at the bifurcation site.

11. The stent delivery assembly of claim 1, wherein the side-branch catheter is a rapid exchange catheter and includes a distal end opening in the tracking guide wire lumen and a side port opening on an outer surface of the side-branch catheter so that the tracking guide wire extends through the side port opening, through the tracking guide wire lumen, and out the distal end opening, and the catheter further includes a slit extending from the side port opening to just proximal of the expandable member so that the tracking guide wire can be unzipped through the slit during catheter exchanges.

12. The stent delivery assembly of claim 1, wherein the side-branch catheter is an over-the-wire catheter and includes a distal end opening in the tracking guide wire lumen and a proximal opening in the tracking guide wire lumen so that the tracking guide wire extends from outside the proximal end

opening, through the tracking guide wire lumen, and out the distal end opening.

13. The stent delivery assembly of claim 8, wherein the main-vessel catheter is a rapid exchange catheter and includes a distal end opening in the tracking guide wire lumen and a side port opening on an outer surface of the main-vessel catheter so that the tracking guide wire extends through the side port opening on the outer surface of the main-vessel catheter, through the tracking guide wire lumen, and out the distal end opening of the main-vessel catheter, the catheter further including a slit extending from the side port opening so that the tracking guide wire can be pulled through the slit during a catheter exchange.

14. The stent delivery assembly of claim 8, wherein the main-vessel catheter is an over-the-wire catheter and includes a distal end opening in the tracking guide wire lumen and a proximal opening in the tracking guide wire lumen so that the tracking guide wire extends from outside the proximal end opening, through the tracking guide wire lumen, and out the distal end opening.

15. A proximal angled stent for implanting in a side-branch vessel adjacent a bifurcation between the side-branch vessel and a main vessel, comprising:

a cylindrical member having a longitudinal axis, the cylindrical member having a distal end and a proximal end;

the distal end forming a first plane section substantially transverse to the longitudinal axis; and

the proximal end forming a second plane section having an acute angle relative to the longitudinal axis, the acute angle being selected to approximately coincide with an

angle formed by the intersection of the side-branch vessel and the main vessel.

16. The proximal angled stent of claim 15, wherein the stent is expandable from a first smaller diameter for delivery in a body lumen to a second expanded diameter by plastically deforming the stent beyond the elastic limits of the material forming the stent.

17. The proximal angled stent of claim 15, wherein the stent is formed from a self-expanding material so that the stent expands from a first smaller diameter for delivery through a body lumen to a second implanted diameter in the body lumen.

18. A main-vessel stent for implanting in a main vessel adjacent a bifurcation, comprising:

a cylindrical member having a distal end and a proximal end and an outer wall surface therebetween; and

an aperture on the outer wall surface being sized and positioned on the outer wall surface so that when the stent is implanted in the main vessel, the aperture is aligned with a side-branch vessel thereby allowing unrestricted blood flow from the main vessel through to the side-branch vessel.

19. The main-vessel stent of claim 18, wherein the stent is expandable from a first smaller diameter for delivery in a body lumen to a second expanded diameter by plastically deforming the stent beyond the elastic limits of the material forming the stent.

20. The main-vessel stent of claim 18, wherein the stent is formed from a self-expanding material so that the stent expands from a first smaller diameter for delivery through a body lumen to a second implanted diameter in the body lumen.

21. A method of implanting a proximal angled stent in a side-branch vessel adjacent to a bifurcation with a main vessel, the method steps comprising:

providing a side-branch catheter assembly having a tracking guide wire lumen extending through at least a portion thereof, an expandable member associated with the catheter and having the proximal angled stent mounted thereon, a stent-positioning guide wire lumen associated with the expandable member, a tracking guide wire sized for slidable movement within the tracking guide wire lumen, and a stent-positioning guide wire sized for slidable movement within the stent-positioning guide wire lumen;

advancing a distal end of the tracking guide wire into the side-branch vessel and distal to a target area;

advancing the side-branch catheter along the tracking guide wire and simultaneously advancing the stent-positioning lumen attached to the outer proximal surface of the expandable member with the stent-positioning guide wire contained therein;

advancing the side-branch catheter in the main vessel to a position just proximal of the side-branch vessel;

advancing a distal end of the stent-positioning guide wire through the main vessel and distal to the side-branch vessel;

further advancing the side-branch catheter so that the positioning guide wire creates rotation of the side-branch catheter as the expandable member and proximal angled stent advance into the side-branch vessel and the side-branch catheter anchors at the side-branch ostium;

aligning the proximal angled stent across the target area and aligning a proximal end of the proximal angled stent with the intersection of the side-branch vessel and the main

vessel so that the proximal angled stent does not extend into the main vessel;

inflating the expandable member thereby expanding and implanting the proximal angled stent at the target area in the side-branch vessel;

deflating the expandable member and withdrawing the side-branch catheter from the patient; and

withdrawing the tracking and stent-positioning guide wires from the patient.

22. The method of claim 21, further comprising implanting a main-vessel stent in the main vessel, including after the step of withdrawing the side-branch catheter and while the stent-positioning guide wire remains in position in the main vessel:

providing a main-vessel catheter having a proximal end and a distal end and a tracking guide wire lumen extending through at least a portion thereof, an expandable member adjacent the distal end of the main-vessel catheter and having the main-vessel stent mounted thereon, a positioning guide wire lumen attached to the outer surface of the main-vessel catheter and extending over at least a portion of the surface of the expandable member;

providing a tracking guide wire contained in the stent-positioning guide wire lumen;

inserting the proximal end of the stent-positioning guide wire into the tracking guide wire lumen;

advancing the main-vessel catheter and the expandable member over the stent-positioning guide wire in the main vessel until the main-vessel catheter is distal end about one cm proximal to the side-branch vessel;

advancing the tracking guide wire out of the stent-positioning guide wire lumen so that the tracking guide wire distal end advances into the side-branch vessel;

manipulating and torquing the tracking and stent-positioning guide wires until the expandable member and main-

vessel stent are in the main vessel and adjacent the side-branch vessel;

inflating the expandable member and the main-vessel stent into contact with the main vessel thereby implanting the stent in the main vessel;

deflating the expandable member and withdrawing the main-vessel catheter from the patient; and

withdrawing the tracking and stent-positioning guide wires from the patient.

23. The method of claim 22, wherein providing the stent-positioning guide wire lumen step further comprises providing the stent-positioning lumen having a straight portion and an angulated portion.

24. A method of stenting a bifurcated vessel, the method steps comprising:

providing a main-vessel catheter for delivering and implanting a main-vessel stent having a plurality of stent cells formed by stent struts;

implanting the main-vessel stent in a main vessel of the bifurcation, the main-vessel stent spanning an opening to a side-branch vessel and precisely orienting the main-vessel stent cells with respect to the side-branch ostium so that subsequent access to the side-branch vessel is not compromised;

withdrawing the main-vessel catheter from the patient;

providing a balloon catheter and advancing the balloon catheter through the main vessel and through a targeted stent cell and into the opening of the side-branch vessel;

expanding a balloon portion of the balloon catheter so that the stent struts of the targeted stent cell adjacent the opening of the side-branch vessel are deformed thereby forming an opening in main-vessel stent that substantially

corresponds to the opening from the main vessel to the side-branch vessel;

providing a side-branch vessel catheter having a proximal angled stent mounted on a balloon portion thereof and advancing the side-branch vessel catheter to the main vessel and through the opening in the main-vessel stent so that the side-branch catheter is advanced into the side-branch vessel;

expanding the balloon portion of the side-branch vessel catheter so that the proximal angled stent on the balloon portion expands into contact with the side-branch vessel, thereby covering all portions of the side-branch vessel immediately adjacent the main vessel; and

withdrawing the side-branch vessel catheter from the patient's vascular system.

25. A stent delivery assembly for treating bifurcated vessels having a side-branch vessel and a main vessel, comprising:

a main-vessel catheter having a proximal end and a distal end;

an expandable member proximate the distal end of the catheter;

a tracking guide wire lumen extending within at least a portion of the main-vessel catheter;

a tracking guide wire having a distal end and a proximal end and sized for slidable movement within the tracking guide wire lumen;

a positioning guide wire lumen having a portion thereof attached to the expandable member and adapted to receive for slidable engagement a positioning guide wire, the positioning guide wire having a distal end and a proximal end;

the proximal ends of the tracking and positioning guide wires extend out of the patient and can be manipulated so that the distal end of the positioning guide wire is advanced in the main vessel distal to the side-branch vessel, and the

distal end of the tracking guide wire is advanced into the side-branch vessel.

26. The stent delivery assembly of claim 25, wherein the portion of positioning guide wire lumen attached to the expandable member extends along the expandable member with a stent mounted over the portion of positioning guide wire lumen.

27. The stent delivery assembly of claim 25, wherein a ramp is associated with a distal end of the positioning guide wire lumen to assist moving the positioning guide wire radially outwardly.

28. The stent delivery assembly of claim 25, wherein the portion of positioning guide wire lumen extends along substantially all of the expandable member.

29. The stent delivery assembly of claim 25, wherein the portion of positioning guide wire lumen includes a distal section attached to the distal end of the catheter.

30. The stent delivery assembly of claim 25, wherein the portion of positioning guide wire lumen is angled and extends along the expandable member.

31. The stent delivery assembly of claim 25, wherein a main-vessel stent is mounted on the expandable member and over the portion of positioning guide wire lumen attached to the balloon.

32. The stent delivery assembly of claim 29, wherein the portion of the positioning guide wire lumen attached to the expandable member includes a distal section biased outwardly to spring away from the expandable member.